Alg. 2 Warm Up # 5-2

Find the inverse equation for each. State the domain of the inverse.

1) $y = \sqrt[3]{x - 3} + 2$

2) $y = 2(x+5)^2 - 8$

3) Simplify: $\dfrac{4}{x^2 + 5x + 6} + \dfrac{2x}{x + 2}$

HW Questions:

6-116. Sketch the graph of $y = \log_3(x+4)$ and describe the transformation from its parent graph.

6-117. Due to the worsened economy, merchants in downtown Hollywood cannot afford to replace their outdoor light bulbs when the bulbs burn out. On average, about thirteen percent of the light bulbs burn out every month. Assuming there are now about one million outside store lights in Hollywood, how long will it take until there are only 100,000 bulbs lit? Until there is only one bulb lit?

13% decrease ---> 100% - 13% = 87%

Multiplier = 0.87

$$y = 1{,}000{,}000(0.87)^t$$

$$\frac{100{,}000}{1{,}000{,}000} = \frac{1{,}000{,}000(0.87)^t}{1{,}000{,}000}$$

$$\log_{10}(0.1) = \log_{10}(0.87)^{t}$$

$$\frac{\log_{10}(0.1)}{\log 0.87} = \frac{t(\log_{10} 0.87)}{(\log 0.87)}$$

6-118. Raymond, Hannah, Aidan, and Sarah were working together to change $y = 3x^2 - 15x - 5$ into graphing form. They started by rewriting it as $y = 3(x^2 - 5x) - 5$, when Raymond said, *"Will this one work? Look, the perfect square would have to be* $(x - 2.5)^2$*."*

After thinking about it for a while, Sarah said, *"That's OK. Negative 2.5 squared is 6.25, but because of the 3 we factored out, we are really adding* $3(6.25)$*."*

*"Yes,"* Aidan added, *"So we have to subtract 18.75 to get an equivalent equation."*

Hannah summarized with the work shown at right.

$y = 3x^2 - 15x - 5$
$y = 3(x^2 - 5x) - 5$
$y = 3(x - 2.5)^2 - 5 - 18.75$
$y = 3(x - 2.5)^2 - 23.75$

What do you think? Did they rewrite the equation correctly? If so, find the vertex and the line of symmetry of the parabola. If not, explain their mistakes and show them how to do it correctly.

$$y = 3(x^2 - 5x + 6.25) - 5 - 18.75$$

$$y = 3(x - 2.5)^2 - 23.75$$

6-118. Raymond, Hannah, Aidan, and Sarah were working together to change $y = 3x^2 - 15x - 5$ into graphing form. They started by rewriting it as $y = 3(x^2 - 5x) - 5$, when Raymond said, *"Will this one work? Look, the perfect square would have to be* $(x - 2.5)^2$*."*

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What do you think? Did they rewrite the equation correctly? If so, find the vertex and the line of symmetry of the parabola. If not, explain their mistakes and show them how to do it correctly.

$$y = 3(x^2 - 5x + \underline{6.25}) - 5 - \underline{18.75}$$

$$\left(-\frac{5}{2}\right)^2$$

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-121. Add or subtract and simplify each of the following expressions. J each step of your process makes sense.

a. $\frac{3}{(x-4)(x+1)} + \frac{6}{x+1}$

b. $\frac{x+2}{x^2-9} - \frac{1}{(x+3)}\frac{(x-3)}{(x-3)}$

$$\frac{x+2}{(x+3)(x-3)} - \frac{(x-3)}{(x+3)(x-3)}$$

$$\frac{x+2-x+3}{(x+3)(x-3)}$$

$$\frac{5}{(x+3)(x-3)}$$

6-122. Eniki has a sequence of numbers given by the formula $\boxed{t(n) = 4(5^n)}$.

a. What are the first three terms of Eniki's sequence?

b. Chelita thinks the number 312,500 is a term in Eniki's sequence. Is she correct? Justify your answer by either giving the term number or explaining why it is not in the sequence.

c. Elisa thinks the number 94,500 is a term in Eniki's sequence. Is she correct? Explain.

$$\frac{312{,}500}{4} = \frac{4(5)^n}{4}$$

$$78{,}125 = 5^n$$

$$\log(78{,}125) = \log 5^n$$

$$\frac{\log 78{,}125}{\log 5} = \frac{n(\cancel{\log 5})}{\cancel{\log 5}}$$

$n = 7$, so yes, 312,500 is the 7th term in the sequence

Yesterday's CP's:

6-106. Since logs and exponentials are inverses, the properties of exponents (which you already know) also apply to logs. The problems below will help you discover these new log properties.

a. Complete the two exponent rules below. In part (b), you will find the equivalent properties for logs.

$$x^a x^b = \underline{x^{a+b}} \quad \text{and} \quad \frac{x^b}{x^a} = \underline{x^{b-a}}$$

b. To help you find the equivalent log properties, use your calculator to solve for $x$ in each problem below. Note that $x$ is a whole number in parts (*i*) through (*v*). Look for patterns that would make your job easier and allow you to generalize in part (*vi*).

*i.* $\log(5) + \log(6) = \log(x)$ *ii.* $\log(5) + \log(2) = \log(x)$

*iii.* $\log(5) + \log(5) = \log(x)$ *iv.* $\log(10) + \log(100) = \log(x)$

*v.* $\log(9) + \log(11) = \log(x)$ *vi.* $\log(a) + \log(b) = \log(\underline{ab})$

c. What if the log expressions are being subtracted instead of added? Solve for $x$ in each problem below. Note that $x$ will not always be a whole number. Again, look for patterns that will allow you to generalize in part (*vi*).

*i.* $\log(20) - \log(5) = \log(x)$ *ii.* $\log(30) - \log(3) = \log(x)$

*iii.* $\log(5) - \log(2) = \log(x)$ *iv.* $\log(17) - \log(9) = \log(x)$

*v.* $\log(375) - \log(17) = \log(x)$ *vi.* $\log(b) - \log(a) = \log(\underline{\tfrac{b}{a}})$

$$\frac{x^6}{x^4} = x^{6-4}$$

CP's: 6- # 108 ---> 111

-108. LOG PROPERTY PUZZLES

Obtain the Lesson 6.2.2A Resource Page from your teacher or copy the table below. Use the log properties to fill in the missing parts. Be sure to rememb that in every row, each expression is equivalent to every other expression.

| | | Product Property | | | | Quotient Property | | |
|---|---|---|---|---|---|---|---|---|
| $\log_3 60$ | = | $\log_3 6 + \_\_\_$ | = | $\log_3 3 + \_\_\_$ | = | $\log_3 120 - \_\_\_$ | = | $\log_3 240 -$ |
| $\log_7 36$ | = | | = | | = | | = | |
| | = | $\log_6 9 + \log_6 2$ | = | | = | | = | |
| | = | | = | | = | $\log_{25} 75 - \log_{25} 1.5$ | = | |
| | = | | = | | = | $\log 160 - \log 4$ | = | |

HW: 6- #113 ---> 115,

119, 120